

REMARKS

Claims 1-36 are pending in this application. Claims 1, 15 and 29-36 are independent claims. Reconsideration and allowance of the present application are respectfully requested.

Allowable Subject Matter

Applicants note with appreciation the Examiner's allowance of claims 1-28.

Claim Rejections

Rejections Under 35 U.S.C. § 103 – *Fertner*

Claims 29 and 33 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,185,251 ("*Fertner*"). Applicants respectfully traverse this rejection for the reasons detailed below.

Claim 29 recites a non-recursive carrier filtering device for an apparatus for direct measurement of channel state of a receiver, comprising, *inter alia*, a multiplier unit which multiplies filtering coefficients by a present carrier value and the one or more delayed carrier values and outputs a second error which is a sum of the multiplied values, **wherein the filtering coefficients are output by an adaptation unit at the receiver using a signal corresponding to an inverse number of the squared magnitude of the channel frequency response** and the second error signal is used to improve channel state estimation. (Emphasis Added)

The Examiner admits that *Fertner* fails to explicitly teach using a signal corresponding to an inverse number of the squared magnitude of the channel frequency response to calculate filter coefficients and that the second error signal is used to improve channel state estimation.¹ However, the Examiner asserts that *Fertner* suggests calculating optimal equalizer coefficients to compensate for channel impairments and that one of ordinary skill in the art would know that "an

¹ Office Action, Page 3

inverse number of the squared magnitude of the channel frequency response” corresponds to the best channel response, as is taught by Bohnke et al. (US 2002/0060990, “*Bohnke*”).²

Applicants respectfully submit that *Bohnke* is directed to a method for adjusting the transmission characteristics of subcarriers of a multi carrier transmission system using a plurality of antenna elements.³ *Bohnke* discloses a TX antenna selection technique according to which the best suited antenna element for each subcarrier can be chosen at the transmitter.⁴ *Bohnke* also teaches a variety of other techniques that are used at the transmitter. Furthermore, neither *Bohnke* nor *Fertner*, taken singly or in combination (if such a combination could be made, which Applicants do not admit), fairly suggest utilizing the various transmitter techniques at the receiver. A person of ordinary skill would therefore have no motivation to combine the teachings of the two references.

As such, *Fertner* fails to render obvious the features of claim 29 and the somewhat similar features recited in claim 33. Therefore, Applicants respectfully request that this rejection of claims 29 and 33 under 35 U.S.C. §103 be withdrawn.

Rejections Under 35 U.S.C. § 103 – *Raleigh et al.*

Claims 30 and 34 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,158,041 (“*Raleigh*”). This rejection is respectfully traversed.

Claim 30 recites a squared Euclidean distance calculating device for an apparatus for direct measurement of a channel state of a receiver, comprising a calculating unit which receives a complex signal for a carrier and calculates **a squared value of a signal for I (In-phase) and a squared value of a signal for Q (Quadrature) of the carrier and outputs an error, which is a**

² Office Action, Page 3

³ *Bohnke*, Abstract

⁴ *Bohnke*, Paragraph [0043]

sum of the squared values, wherein the error is used to improve channel state estimation.

(Emphasis Added)

The Examiner admits that *Raleigh* fails to explicitly teach “**which is a sum of the squared values**” as recited by claim 30. However, the Examiner asserts that *Raleigh* suggests a periodic distance vector corresponding to the sum of the squared Euclidean distance.⁵

Applicants respectfully submit that *Raleigh* defines periodic product distance as being similar to the product distance except that it is appropriate for the case when the total or substantial loss of entire symbols occurs in a periodic fashion. *Raleigh* defines periodic product distance in terms of a periodic distance vector, the length of which is equal to the symbol corruption period. Each element in the periodic distance vector is the sum of the squared Euclidean distance seen by the symbols in the corresponding phase of the period. By stating “corresponding phase,” *Raleigh* teaches the sum of the squared Euclidean distance between each symbol in either the I-phase or the Q-phase. From this, the Examiner will surely appreciate that *Raleigh* does not teach, disclose or fairly suggest “a calculating unit which ... calculates a **squared value of a signal for I (In-phase)** and a **squared value of a signal for Q (Quadrature)** of the carrier and outputs an error, which is a **sum of the squared values**,” as recited in independent claim 30 and the somewhat similar features recited in independent claim 34.

As such, *Raleigh* fails to render obvious the limitations of claim 30 and the somewhat similar features recited in claim 34. Therefore, Applicants respectfully request that this rejection of claims 30 and 34 under 35 U.S.C. §103 be withdrawn.

⁵ Office Action, Page 4

Rejections Under 35 U.S.C. § 103 – *Chiou et al. in view of Fertner*

Claims 31 and 35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Publication No. 2004/0218519 (“*Chiou*”) in view of *Fertner*. This rejection is respectfully traversed.

Claim 31 recites an adaptation device for an apparatus for direct measurement of a channel state of a receiver, comprising, *inter alia*, an estimating unit which estimates a correlation coefficient signal of two or more adjacent carriers using **a signal corresponding to an inverse number of a squared magnitude of the channel frequency response at the receiver.** (Emphasis Added)

The Examiner admits that *Chiou* fails to specifically disclose estimating the correlation coefficient signal of two or more adjacent carriers using a signal corresponding to an inverse number of the squared magnitude of the channel frequency response and relies on *Fertner* to overcome the deficiencies of *Chiou*.⁶

Fertner teaches feeding the equalizer 52 with optimal values of equalizer filter coefficients thereby compensating equalizer output samples y_n for channel induced ISI.⁷ The equalizer filter coefficients of *Fertner* are generated using received signal samples x_n ,⁸ unlike “using a signal corresponding to an inverse a squared magnitude of the channel frequency response,” as recited by claim 31.

The Examiner then asserts that one of ordinary skill would know that “an inverse number of the squared magnitude of the channel frequency response,” corresponds to the best channel response as is taught by *Bohnke*.⁹

⁶ Office Action, Page 5

⁷ *Fertner*, Column 14, Lines 38-47

⁸ *Fertner*, FIG.4 and Columns 5, Lines 39-44

⁹ Office Action, Page 5-6

Applicants respectfully submit that *Bohnke* teaches a variety of TX antenna selection techniques according to which the best suited antenna element for each subcarrier can be chosen at the transmitter. Furthermore, neither *Bohnke* nor *Fertner*, taken singly or in combination, fairly suggest utilizing the various techniques from the transmitter at the receiver of a system to estimate the optimal coefficients for channel impairments. Even assuming *arguendo* the teachings of *Bohnke* and *Fertner* can be combined (which the Applicants do not admit); this would likely render the resultant combination inoperable. As such, *Bohnke* fails to overcome the noted deficiencies of *Fertner* which in turn fails to overcome the deficiencies of *Chiou* thereby rendering claim 31 and the somewhat similar features recited in claim 35 non-obvious to one of ordinary skill in the art.

Therefore, Applicants respectfully request that this rejection of claims 31 and 35 under 35 U.S.C. §103 be withdrawn.

Rejections Under 35 U.S.C. § 103 – *Fertner*

Claims 31 and 35 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Fertner*. This rejection is respectfully traversed.

The Examiner admits *Fertner* fails to explicitly teach “an estimating unit which estimates a correlation coefficient signal of two or more adjacent carriers using a signal corresponding to an inverse a squared magnitude of the channel frequency response,” as recited by claim 31, but asserts that *Fertner* suggests calculating optimal equalizer coefficients used to compensate for channel impairments and alleges that one of ordinary skill would know that “an inverse a squared magnitude of the channel frequency response” corresponds to the best channel response, as taught by *Bohnke*.

Applicants respectfully submit that *Bohnke* teaches a variety of TX antenna selection techniques according to which the best suited antenna element for each subcarrier can be chosen at the transmitter. Furthermore, neither *Bohnke* nor *Fertner*, taken singly or in combination (if such a combination could be made, which Applicants do not admit), fairly suggest utilizing the various transmitter techniques at the receiver end of a system to estimate the optimal coefficients for channel impairments. Utilizing the teachings of *Bohnke* at the receiver of *Fertner* would likely render the resultant combination inoperable.

As such, *Fertner* fails to render obvious claim 31 and the somewhat similar features recited in claim 35. Therefore, Applicants respectfully request that this rejection of claims 31 and 35 under 35 U.S.C. §103 be withdrawn.

Rejections Under 35 U.S.C. § 103 – *Fertner* in view of *Raleigh*

Claims 32 and 36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over *Fertner* in view of *Raleigh*. This rejection is respectfully traversed.

Independent claim 32 recites features somewhat similar to independent claims 29, 30 and 31. Arguments with respect to claims 29, 30 and 31 also therefore apply to claim 32.

Method claim 36 recites features somewhat similar to claim 32. Arguments with respect to claim 32 also therefore apply to claim 36.

Accordingly, claims 32 and 36 are rendered non-obvious to one of ordinary skill in the art by *Fertner* in view of *Raleigh*.

Therefore, Applicants respectfully request that this rejection of claims 32 and 36 under 35 U.S.C. §103 be withdrawn.

CONCLUSION

In view of the above remarks and amendments, Applicants respectfully submit that each of the rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant hereby petitions for a one (1) month extension of time for filing a reply to the outstanding Office Action and submit the required \$120.00 extension fee herewith.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John A. Castellano at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,
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By

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